

**Testimony of  
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Subcommittee on Oversight and Investigations**

**Hearing on**

**Reducing the Threat of Nuclear Terrorism: A Review of the Department of  
Energy's Global Threat Reduction Initiative**

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Mr. Chairman, I appreciate the opportunity to contribute to this important hearing on the Department of Energy's Global Threat Reduction Initiative to combat nuclear and radiological terrorism. My work on preventing nuclear and radiological terrorism began on September 12, 2001, when I was serving in the Department of State's Office of the Senior Coordinator for Nuclear Safety. On that date, I was asked to write a memorandum to then-Secretary of State Colin Powell warning him about the threat of radiological dispersal devices (RDDs), one type of which is popularly called a "dirty bomb." In March 2002, I left government service to work as scientist-in-residence at the Monterey Institute's Center for Nonproliferation Studies (CNS). In January 2003, CNS published "Commercial Radioactive Sources: Surveying the Security Risks," one of the first in-depth post-9/11 reports on the RDD threat. I was the lead author of that report. Involvement in that report led to officials at the Department of Energy's National Nuclear Security Administration (NNSA) hiring me, as a non-governmental consultant, in April 2003 to help them develop their action plan to secure dangerous radioactive sources that could fuel potent RDDs. I am pleased that in May 2004, then-Secretary of Energy Spencer Abraham launched the Global Threat Reduction Initiative (GTRI), an integrated program to apply NNSA's expertise to securing, removing, and disposing of both high-risk radioactive sources and nuclear-weapons-usable highly enriched uranium throughout the world.

This first anniversary of GTRI's launch presents an opportune time to take stock of what GTRI has accomplished and what the United States needs to do to continue to strengthen nuclear and radiological security efforts. NNSA deserves substantial credit for working to prevent nuclear and radiological terrorism through the GTRI and other important programs. Because the U.S. government's witnesses have ably reviewed the accomplishments to date and the progress in achieving current program goals, I will

mainly provide a brief assessment of the thinking behind GTRI and then will address some urgently needed enhancements.

Among U.S. government agencies, the NNSA has the unique technical and policy strength to tackle nuclear and radiological terror threats. It can draw on the technical talent residing in the U.S. national laboratories. In particular, Argonne National Laboratory has provided much of the technical muscle in working to convert dozens of research reactors worldwide from weapons-usable highly enriched uranium (HEU) to non-weapons-usable low enriched uranium. For decades during the Cold War, the two major suppliers of HEU-fueled reactors were the United States and the Soviet Union. Starting in the late 1970s, the United States and the Soviet Union recognized the dangers of HEU-fueled research reactors and began a program to convert these reactors to low enriched fuels. Based on the past several years of nuclear security work in the former Soviet Union, NNSA officials have also formed valuable working relationships with their counterparts in this region, where large stockpiles of vulnerable radiological and nuclear materials are located. GTRI has expanded its reach beyond the former Soviet Union to include about 40 countries.

Domestically, the Department of Energy, for decades, has had the responsibility to provide a secure disposal pathway for many of the most potent commercial radioactive sources. In late 2003, NNSA was wisely put in charge of this important domestic program – the Off-Site Source Recovery (OSR) Project -- because the Department's leadership recognized it is a national security program as well as a radioactive waste disposal program. The OSR Project deserves praise for successfully exceeding its congressional mandate by securing more than 10,000 at-risk disused radioactive sources throughout the United States. I believe that it should continue to receive needed financial support from Congress. The program expenditures to date have been very modest compared to the accomplishments.

In sum, GTRI works both domestically and internationally. This broad-based approach should give GTRI the capability to apply lessons learned within the United States to challenges confronted abroad.

Also, GTRI works to prevent use of the quintessential weapon of mass *destruction* – a nuclear explosive -- and the archetypal weapon of mass *disruption* – a radiological dispersal device. Security experts agree that terrorist detonation of a nuclear weapon is far less likely to happen, but far more damaging, than terrorist use of a radiological weapon. While there is consensus on this qualitative risk assessment, there is disagreement among experts about how to allocate scarce government resources to combating nuclear and radiological threats.

Should the U.S. government and its international partners spend more resources on preventing and preparing for the most damaging or the most likely acts of nuclear and radiological terrorism? To answer this question, I devoted more than two years while at CNS writing the book *The Four Faces of Nuclear Terrorism* with William Potter, Amy Sands, Leonard Spector, and Fred Wehling. Published last year, this book provides a

prioritized plan for combating nuclear and radiological threats. The book's fundamental conclusion "is that the United States must work immediately to reduce the probability of nuclear terror acts with the highest consequences and mitigate the consequences of the nuclear terror acts that are the most probable." Because of the horrendous damage from a nuclear explosion, I believe that the United States needs to spend more resources on preventing this threat from occurring than preventing the much less harmful dirty bomb attack. Nonetheless, as discussed in detail below, a wise, but still limited, investment of government resources can do much to reduce the likelihood and consequences of dirty bomb attacks.

The highest consequence nuclear terror act – terrorist detonation of a nuclear explosive -- would have devastating effects and could cause the American people to lose confidence in their government. To carry out that attack, terrorists would need to acquire an intact nuclear weapon from a military arsenal or to seize highly enriched uranium or plutonium to make an improvised nuclear device. Of these three pathways to devastating nuclear terror, the highly enriched uranium route offers terrorists the easiest method, assuming that official custodians of nuclear weapons do not provide terrorists detailed assistance in detonating an intact nuclear weapon. Unlike plutonium, HEU can fuel the easiest to build nuclear weapon – a gun-type device – the type of bomb exploded at Hiroshima. Such a crude, but devastating, weapon would not require nuclear testing and would be within the technical capability of certain terrorist groups. The most significant hurdle to the terrorists is access to sufficient amounts of HEU. While governments must provide rigorous security around intact nuclear weapons and plutonium stockpiles, they must prioritize securing, consolidating, and *eliminating* HEU stocks in both the military and civilian sectors. Because GTRI aims to reduce and remove HEU from vulnerable locations throughout the world, it is on the right path. But the United States can do much more to accelerate efforts to secure and remove dangerous HEU.

**The United States should continue to de-legitimize use of civilian highly enriched uranium.** U.S. government policy already points strongly in this direction. The GTRI Web site, in particular, states that one of its important goals is to "minimize and, to the extent possible, eliminate the use of highly enriched uranium (HEU) in civil nuclear applications worldwide." Dating back to at least 1978 with the beginnings of the Reduced Enrichment for Research and Test Reactors (RERTR) program, the United States has been striving to remove HEU from the civilian sector. Lending further support for this policy, Congress passed in 1992 the Schumer amendment to require recipients of U.S. HEU to commit to converting their reactors to using non-weapons-usable low enriched uranium. ***Mr. Chairman, I urge your committee to strengthen the purpose behind the Schumer amendment.*** At a time when President Bush has identified terrorists armed with nuclear weapons as the gravest danger that our country faces and at a time when Osama bin Laden, one of America's greatest enemies, covets nuclear weapons, we need to make sure that U.S. legislation does everything that it can to remove the temptation of HEU from nuclear terrorists. Consequently, I recommend that your committee should work to determine what it would require in terms of financial cost and political commitment for medical isotope production companies requesting HEU supplies to convert expeditiously to employing low enriched uranium in their isotope production reactors.

**The United States should promote removal of HEU from potentially vulnerable sites to any secure location, not necessarily the country of origin.** GTRI is striving to repatriate Soviet- and Russian-origin HEU fuel in seventeen countries back to Russia; similarly, it is working to repatriate U.S.-origin fuel in several countries back to the United States. While this objective is laudable, if GTRI encounters resistance in expeditiously repatriating HEU fuel back to the country of origin, GTRI program managers should develop the program flexibility to remove this dangerous material to any secure site. For instance, if a particular country holding Soviet-origin HEU objects to repatriating this material to Russia, GTRI managers should try to find a creative way to go around this roadblock. Perhaps officials of the country in question would welcome sending their HEU to an existing secure facility outside of Russia. GTRI managers should request, if necessary, the program flexibility to emphasize removal of vulnerable HEU and not be tied down to a restrictive repatriation policy.

**The United States should mobilize its intelligence resources to support the mission of GTRI.** To help GTRI meet the worthy goals of securing HEU and converting HEU-fueled research reactors, better intelligence assessments of facilities containing HEU are urgently needed. While NNSA recognizes that the insider threat is the most dangerous threat to loss of HEU from these facilities, it is unclear whether NNSA has developed detailed intelligence profiles of each facility. If NNSA is not already doing so, Mr. Chairman, I recommend that your committee urge NNSA and GTRI managers to coordinate their programs' activities with the intelligence community. To determine how vulnerable HEU at a facility is to theft or diversion, the United States needs to know who works at each facility, how susceptible is each worker to blackmail or other means of coercion, how much scientific or commercial work is done at each facility, and what physical security protection measures are in place. A detailed intelligence profile would also determine how much it would cost to shut down each facility and direct workers to early retirement or to move their research or commercial activities to a more secure facility. Shutting down and consolidating vulnerable HEU facilities could result in significant monetary savings. *The United States needs to move as quickly as possible along as many parallel paths to remove HEU from vulnerable facilities, to convert needed facilities to low enriched uranium use, and to shut down or buy out unneeded facilities.*

Turning to the second major component of GTRI, I want to address the issue of radioactive materials security. In certain respects, this issue involves a different security paradigm than HEU security. Unlike HEU, radioactive sources have a legitimate commercial use. Every day, millions of people rely on radioactive isotopes to perform beneficial medical, industrial, and scientific purposes. In contrast to de-legitimizing HEU use, it would cause more harm than good to completely phase out use of radioactive sources. That being stated, NNSA and the Nuclear Regulatory Commission (NRC) along with international partners, such as the G-8 and the International Atomic Energy Agency, can work together to more smartly employ radioactive sources and ionizing radiation.

**GTRI should work closely with the NRC to apply lessons learned in the successful recovery of thousands of disused radioactive sources.** Within the United States, there are two regulatory systems for control of radioactive sources. The Agreement States system, formed under the 1954 U.S. Atomic Energy Act, as amended, includes 33 states. These states have primary responsibility, with the NRC providing an oversight role, for licensing commercial radioactive sources within their jurisdictions. In contrast, the other 17 states turn to the NRC to directly license their sources. Recently, Morgan Baker, one of my graduate students at the Security Studies Program at Georgetown University, discovered while writing his Master's degree thesis that the states under the Agreement States system appear to control their radioactive sources better than those states directly licensed by the NRC. Because of his resource and time constraints, he only examined four states. The GTRI's Off-Site Source Recovery program has amassed a database of thousands of disused sources found throughout the United States. This database can be mined for valuable information as to which states have done the best job at controlling radioactive sources. ***Mr. Chairman, I urge your committee to direct the NRC, the GTRI, and the Agreement States to work together to share information in order to determine best security practices among the states. In the interests of impartiality, Mr. Chairman, I recommend that an independent organization, such as the National Academy of Sciences, perform the analysis.***

**The United States and international partners should build a sustainable radioactive materials security system.** Such a system would go beyond merely locking up high-risk radioactive sources. GTRI officials to a large extent recognize this and have been leveraging IAEA assistance as well as working closely with their counterparts in other countries to develop a safety and security culture. To paraphrase words of wisdom from the Bible, it is better to teach a man how to build his own effective security system than to keep providing security for him. Nonetheless, for countries with weak controls over radioactive sources, there is an urgent need for GTRI to provide rapid security upgrades. A long term sustainable solution involves strengthening the regulatory systems within those countries. The IAEA has had a program to do that since 1995. But building strong regulatory systems take time. They cannot just be legislated into existence. Training skilled regulatory officials requires sustained effort. Another important aspect of making the security of radioactive sources stronger is using these materials wisely. As explained earlier in this testimony, radioactive materials should not be fully phased out. Nonetheless, smart alternative technologies can be used to replace certain types of high-risk radioactive sources. In the fall 2003 volume of the National Academies journal *Issues in Science and Technology*, Joel Lubenau, a former senior adviser to the Nuclear Regulatory Commission, and I wrote:

The International Commission on Radiological Protection and the congressionally chartered National Council on Radiation Protection and Measurements (NCRP) hold as a pillar of radiation protection the principle of justification. This principle calls for evaluating the risks and benefits of using a radioactive source for a particular application. Users are supposed to opt for a nonradioactive alternative if there is one that provides comparable benefit and less risk, including the risk associated with waste management.

The NRC has taken the position that advocating alternative technologies is not part of its mission. The commission's reasons, which have not been explained, might be that it believes it is only in the business of regulating the radioactive sources that licensees choose to use, not the business of overseeing licensees' decisions to use them. Nonetheless, it can be argued that the NRC's charge from Congress—to protect public health, safety, and property as well as provide for the common defense and security—is sufficient to require the commission to adopt the principle of justification and, at least in principle, to encourage the consideration of alternative technologies. This is not to suggest that the NRC should second-guess licensees' decisions to use radioactive sources, simply that the commission should ensure that licensees are making informed decisions that take into account justification and technological alternatives. Applying the principle of justification would reduce the number of radioactive sources in use and thus cut the risk of an RDD event occurring. The National Academy of Sciences, the International Atomic Energy Agency (IAEA), the NCRP, and the Health Physics Society have all recommended that users consider alternative technologies.

One U.S. industry that is adopting alternative technologies is steel, itself no stranger to the risks and costs of radioactive contamination. Steel mills use nuclear gauges to monitor the level of molten steel in continuous casters. If molten steel breaks through the casting system and strikes a gauge, the gauge housing and even the source could melt, causing contamination. Accordingly, mill operators are replacing nuclear gauges on continuous casters with eddy current and thermal systems, even though they are more expensive. The tradeoff—the cost of alternative technology versus the cost of contamination—makes the new systems a smart choice.

Some of the national laboratories are performing R&D to replace the most dangerous radioactive sources (those containing very dispersible radioactive compounds) with sources that pose less of a security hazard. Unfortunately, technology developed at the national labs is not readily available to the marketplace. At an IAEA conference on the radioactive source industry in April 2003, major source producers reportedly expressed interest in forming public-private partnerships to bring these alternative technologies to market. In the United States, such partnerships are sorely needed.

***Mr. Chairman, I recommend that you encourage the NRC to keep licensees informed of smart alternative technologies that can safely and securely replace certain high-risk radioactive sources. I also recommend that your committee encourage the formation of private-public partnerships to develop radioactive sources that are less hazardous to use in potent dirty bombs.*** This action plan would support U.S. security and complement the important national security work done by the NRC and GTRI.

Mr. Chairman, thank you very much for giving me the opportunity to contribute to this hearing and to offer some recommendations to enhance national security and to prevent the use of nuclear and radioactive materials in acts of nuclear terrorism.